

Application No.: 10/716,181

Amendment Dated: October 14, 2008

Reply to Office Action of: May 12, 2008

Docket No.: F132

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Remarks/Arguments

Claims 1-46 are in the application. Claims 40-41 have been previously withdrawn. Claims 1, 9, 15, 24, 39, and 42 are in independent form. Claim 42 is amended to correct a typographical error.

Elections/Restrictions

Examiner asserts that the application contains claims drawn to a non-elected invention. Applicants respectfully maintain that the claims in question, claims 40-41, were properly withdrawn from consideration in the previous response by indicating "(Withdrawn)" after the claim numbers, as required by 37 CFR § 1.121. As is also proper, the text of the withdrawn claims was not deleted. "Each amendment document that includes a change to an existing claim, cancellation of an existing claim or addition of a new claim, must include a complete listing of all claims ever presented, including the text of all pending and withdrawn claims, in the application. (*Id.*, emphasis added).

The claim listing of the current response properly withdraws claims 40-41 in the same manner.

Claims Rejection Under 35 U.S.C. § 112

Claims 1-39 are rejected under 35 U.S.C. § 112 as indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, most of the rejected claims are rejected for using the word "closely," while the rest were rejected for using the word "slightly." According to the Examiner, each of these words is "a relative term

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that lacks basis for comparison." As explained in Applicants' Response to the Office Action of Sept. 17, 2007, and repeated below, Applicants disagree. It is well established that the use of terms of degree like "closely" and "slightly" are permissible in patent claims. Further, the language of the rejected claims, especially when considered in the light of the explanation of the invention provided in the specification, very clearly describes the limitations at issue and their relationship to the other components of the claimed invention. Thus, contrary to the Examiner's rejection, the terms do provide "basis for comparison."

Accordingly, Applicants re-urge the argument below as originally presented in their Response to the Office Action of Sept. 17, 2007:

The second paragraph of 35 U.S.C. § 112 only requires claims to set out and circumscribe a particular area with a reasonable degree of precision and particularity. *In re Johnson*, 558 F.2d 1008, 1015, 194 USPQ 187, 193 (CCPA 1977). "The Examiner's focus during examination of claims for compliance with the requirement for definiteness of 35 U.S.C. § 112, second paragraph, is whether the claims meet the threshold requirements of clarity and precision, not whether more suitable language or modes of expression are available. . . . Some latitude in the manner of expression and the aptness of terms is permitted even though the claim language is not as precise as the examiner might desire." MPEP § 2173.02. Furthermore, the applicants may use functional language, alternative expressions, negative limitations, or any style of expression or format of claim which makes clear the boundaries of the subject matter for which protection is sought. MPEP § 2173.01.

The particular terms used in Applicants' claims are more appropriately described as "terms

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of degree" because they modify the degree to which the mill rate of the second material must approximate the mill rate of the first material—"closely approximate" in one set of claims and "equal to or slightly greater than" in the other. The use of such terms is very common in patent claims¹ and has long been approved by the Federal Circuit Court. For example, in *Andrew Corp. v. Gabriel Electronics Inc.*, 847 F.2d 819, 821-22, 6 USPQ2d 2010, 2013 (Fed.Cir.1988), the Court specifically noted that terms such as "approach each other," "close to," "substantially equal," and "closely approximate" (virtually the same phrase used in Applicants' claims) are seemingly used everywhere in patent claims and that such usages, when serving reasonably to describe the claimed subject matter to those of skill in the field of the invention and to distinguish the claimed subject matter from the prior art, have been accepted in patent examination and upheld by the courts. More recently, this point was reaffirmed by the Federal Circuit in *Ecolab, Inc. v. Envirochem, Inc.*, 264 F.3d 1358, 60 USPQ2d 1173 (Fed. Cir. 2001). The *Ecolab* Court noted that terms of degree are commonly used in patent claims to "avoid a strict numerical boundary to the specified parameter."

Although not published, *Ex Parte Rasmussen*, 1998 WL 1780745 (Bd. Pat. App. & Interf. 1998) is instructive. This reference was previously provided to the Examiner in Applicants' Response to the Office Action of Sept. 17, 2007. In *Rasmussen*, the Examiner had rejected claims under 35 USC § 112 as indefinite for using the phrase "shaped to closely overlay." (emphasis

¹ Applicants note that, since 1976, the term "closely" has been used in the claims of more than 47,000 issued patents, while the exact phrase used in Applicants' Specification, "closely approximates," has been used in the claims of more than 330 issued patents. Likewise, the term "slightly" has been used in the claims of more than 57,000 issued patents, while the exact phrase used in Applicants' Specification, "slightly greater than," has been used in the claims of more than 7700 issued patents.

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added.) The Board did not sustain the Examiner's rejection and noted " We do not understand the reasoning behind the examiner's problem with the phrase "shaped to closely overlay". . . . From our perspective, the language of the claim, especially when considered in the light of the explanation of the invention provided in the specification, very clearly describes the [element of the invention at issue] and its relationship to the other components of the claimed invention." *Id.* at *2.

In the present case, as in *Rasmussen*, the use of the rejected terms is explained fully in the Specification. For example, Applicants' Specification states:

[1062] Preferably, an appropriate overcoat material will have a mill rate at higher incidence angles that closely approximates the mill rate of the structure material. Most preferably, an appropriate overcoat material will have a mill rate at higher incidence angles that is equal to or slightly higher than the mill rate of the structure material. Skilled persons will realize that an overcoat material with a slightly lower mill rate than the structure at higher incidence angles might provide acceptable results, but there would likely be some degree of curtaining. As discussed above, where possible, it is desirable for the mill rates of overcoat and substrate to match throughout a broader range of higher incidence angles (for example from 45 degrees approaching 90 degrees) in order to account for variations in milling conditions.

The Specification makes it clear that the closer the two mill rates are, the less surface variation that will result. However, no two different materials will have the exact same milling rate. Further, the difference in milling rate will vary at different incidence angles. Specification at [1045]. As a result, the mill rates may be similar at some incidence angles but very different at other incidence angles. According to Applicants' invention, better results will be obtained if the mill rates are matched from around 75 to 90 degrees. *Id.* at [1051]. Further, FIG. 4 of the

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Application and the accompanying text provide an illustration of the mill rate matching process for a Permalloy substrate and two different possible overcoat materials. *Id.* at [1046] to [1051].

Examiner asserts that "it is unclear how close the mill rate of the second material needs to approximate the first material." As was the case in *Rasmussen*, the language of Applicants' claims, especially when considered in the light of the explanation of the invention provided in the Specification, very clearly describes the degree to which the mill rate of the overcoat material must approximate the mill rate of the substrate material.

Accordingly, Applicants request that the Examiner's § 112 objections be withdrawn. If the objections are not withdrawn, Applicants respectfully request that the Examiner provide "an analysis" of why the phrases used in the claims are 'vague and indefinite.'" The MPEP provides: "If upon review of a claim in its entirety, the examiner concludes that a rejection under 35 U.S.C. 112, second paragraph, is appropriate, such a rejection should be made and an analysis as to why the phrase(s) used in the claim is "vague and indefinite" should be included in the Office action." MPEP § 2173.02. Further, the MPEP provides that "[d]efiniteness of claim language must be analyzed, not in a vacuum, but in light of: (A) The content of the particular application disclosure; (B) The teachings of the prior art; and (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made." *Id.*

The conclusory statement (repeated verbatim for each rejected claim) that the terms are indefinite because each is "a relative term that lacks basis for comparison" does not provide the level of analysis required by the MPEP. The additional response found in the Examiner's Response

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to Applicants' Arguments is no better. The Examiner simply states that the "metes and bounds" of the terms are unclear. Neither explanation provides any meaningful explanation or discussion of Applicants' Specification, the prior art, or how the Examiner believes that the terms would be interpreted by one of ordinary skill in the art.

Claims Rejection Under 35 U.S.C. § 102

Claims 1 and 4-7 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,874,010 to Tao et al ("Tao"). A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987); *see* M.P.E.P. § 2131. Applicant submits that the references cited by the Examiner do not set forth, either expressly or inherently, all of the elements of the rejected claims.

The Tao reference is completely different than Applicants' invention and does not teach any of the significant limitations in Applicants' claims. In Tao, the layer deposited onto the substrate is a mask layer. As such it is intended to protect the substrate during etching. Because the mask material etches much more slowly than the substrate, the "pole-piece material" is etched away where it is not covered by the mask, but is not etched where the mask is present. This process, which is well-known in lithography, has virtually nothing in common with Applicants' invention.

In fact, Tao teaches a process which is essentially the exact opposite of Applicants' invention. Contrary to the limitations in Applicants' claims, the mill rate of the mask layer in Tao must be significantly different (slower) than the mill rate of the substrate or the mask effect will not work and the desired pole structure will not be formed. In contrast to Tao, Applicants' invention

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teaches milling rates for the overcoat and the substrate that closely approximate each other. For example, claim 1 requires that the deposited layer have "mill rates at higher incidence angles that closely approximate the mill rates of the first material [the substrate] at those incidence angles." According to Applicants invention, the overcoat layer does not protect the substrate from milling, rather the focused ion beam is used to slice through both layers and produce a vertical cross-section face.

The Examiner alleges that Tao teaches depositing a first layer and a second layer where the etch rates of the layers "closely approximate" each other, and that the claims do not require "matching," but only "closely approximating." Applicants initially note that the use of the term "matching" in the previous Office Action was not an assertion that the claims used the term "matching," but was rather an attempt to explain the concept of the invention to the Examiner.

Further, it appears that the Examiner may be confused as to the usage of the words "matching" and "closely approximating" as used in the claims and as described in the specification. "Matching" is not used as a term of degree to mean that the mill rates of the first and second materials are *identical*. Rather the term is used to indicate that materials are selected (matched) that have mill rates that closely approximate each other. No person of ordinary skill would have any difficulty understanding this concept, especially when considered in the light of the explanation of the invention provided in the Specification.

In contrast, the Tao reference teaches an overcoat (mask) layer where the mill rate is intentionally much slower than the mill rate of the substrate. In other words, Tao is also "matching," but Tao is matching materials with mill rates that *DO NOT* closely approximate each other, where Applicant is matching materials with mill rates that *DO* closely approximate each

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other.

Applicants also note that the process taught by Tao would not produce a uniformly planar face on the cross-section as also required by Applicants' claims. As explained in great detail in Applicants' Specification, an overcoat material with a substantially lower mill rate (such as the mask layer taught by Tao) would produce a great deal of curtaining. The Examiner states that Tao does teach a uniform cross sectional face and points to Tao's FIG. 1C in support. Applicants submit that the FIG. 1C shows nothing of the sort. Drawings in a patent application "must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art." See MPEP § 2125. "Proportions of features in a drawing are not evidence of actual proportions when drawings are not to scale. When the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value." *Id.* There is absolutely nothing in Tao to indicate that FIG. 1C was attempting to show that a planar cross section face would result from the method taught by Tao. And in fact, as explained in Applicants' Specification, such a uniform face would not be produced.

Further, Applicants note that on page 7 of the same Office Action, the Examiner takes the opposite position on Tao, expressly stating that Tao teaches that utilizing different materials with different etching rates "would result in a non-planar cross-section face." In fact, neither of these contradictory positions are accurate. Tao simply does not teach anything at all about either a planar or non-planar cross section face. Tao addresses a completely different problem in a completely different manner.

Accordingly, Applicants request that the § 102 rejections be withdrawn.

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Claims Rejection Under 35 U.S.C. § 103*Claims 2, 3, 8-14, 24-38 and 42-46*

Claims 2, 3, 8-14, 24-38, and 42-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao in view of U.S. Patent No. 6,198,608 to Hong et al. ("Hong"). To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Further, the Examiner must articulate some reason or rationale to combine the references as suggested. Applicants submit that the rejected claims all contain limitations which are not described or taught by the cited references. Further, the Examiner has failed to provide any reasonable rationale supporting the combination of references.

As is the case with the Tao reference discussed above, the portions of the Hong reference cited by the Examiner do not teach any of the limitations found in Applicants' claims. Like Tao, Hong teaches a slow ion-milling layer that serves as a mask during the milling process. As discussed above, this is virtually the opposite of the process claimed by Applicants. The rejected claims teach an overlayer with a mill rate that closely approximates the mill rate of the substrate. Both Hong and Tao teach a process with a mask layer which mills at a much slower rate than the substrate. As discussed in great detail in Applicants' Specification, the process described by Tao and Hong would result in a large degree of curtaining, rather than the uniform planar face produced by Applicants' invention and required by the rejected claims.

Applicants also note that according to the Examiner, "by selection of layers in Tao et al. one determines what layers to select and each layer has its own etching characteristics." Even if this

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were an accurate statement of the teachings of Tao, the Examiner does not mention (and Tao does not teach) selecting a first material for a protective layer "from known materials having a mill rate at higher incidence angles that will produce the desired topography of the cross-section face" or "from known materials having a mill rate at higher incidence angles that approximates the mill rates of said second material at higher incidence angles." These limitations (found in Applicants' claims 24-38 and 42-46) are simply not taught or even suggested by any of the cited references.

The Examiner also states that Tao already discusses that "tungsten would have mill rates at incidence angles greater than 45 degrees that closely approximate [and that are equal to or slightly greater than] the mill rates of the first material at incidence angles greater than 45 degrees." However, the section of Tao quoted by the Examiner is little more than a chart showing mill rates for various materials. The only commentary in the section of the reference cited by the Examiner deals with material selection to make the etching of the mask overlayer more selective--in other words, how to to maximize the difference in the etch rates between the mask and the substrate.

Further, the Examiner has still not provided any reasonable rationale supporting the combination of references. According to the Examiner, "[t]he motivation for utilizing the features of Hong et al. is that it allows for utilizing a low milling rate material." Applicants respectfully submit that this is not a reasonable explanation. Tao already made use of a low milling rate mask layer. See Tao, col. 4, lines 37-67. The method taught by Tao makes use of mask materials that form nitrides in the presence of Ar and N₂. As shown by the milling rate chart in Tao (repeatedly cited by the Examiner) C does not have a different mill rate when nitrogen is used as an etching ion so there would be no incentive to use carbon with the invention described by Tao.

The Examiner also states that the motivation for combining the references is that "it allows

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for controlling the etch rate of the various deposited layers." Applicants suggest that the Examiner has found this motivation, not in the cited reference or in the general knowledge available to a person of ordinary skill in the art, but rather in Applicants' own Specification. The references only teach using a much slower milling material over the substrate as a mask. Neither teaches anything about "controlling" the etch rates of the various layers. The Examiner has only arrived at this rationale because he has Applicants' invention in mind. The Federal Circuit has repeatedly emphasized that this is not a permissible approach in determining obviousness under § 103. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 36, 86 S. Ct. 684 (1966) (warning against a "temptation to read into the prior art the teachings of the invention in issue" and instructing courts to "guard against slipping into the use of hindsight").

Claims 15-23 and 39

Claims 15-23 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao et al., in view of Hong and further view of WO 03/019523 to Tasker et al ("Tasker"). As discussed above, neither the Tao nor Hong references teach or suggest all the claim limitations in Applicants' claims. As for the Tasker reference, Applicants submit that 37 C.F.R § 1.131 provides:

(a) When any claim of an application or a patent under reexamination is rejected, the inventor of the subject matter of the rejected claim, the owner of the patent under reexamination, or the party qualified under §§ 1.42, 1.43, or 1.47, may submit an appropriate oath or declaration to establish invention of the subject matter of the rejected claim prior to the effective date of the reference or activity on which the rejection is based.

Applicants have submitted herewith declarations under 37 §1.131 from all of the co-inventors of the present invention attesting that the present invention was invented prior to the publication date of the Takaoka reference.

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Applicants hereby submit that the declarations of James P. Nadeau, Pei Zou, and Jason H. Arjavac under 37 C.F.R. § 1.131 and the attached disclosure dated before the publication date of Takaoka are sufficient to establish the prior invention of the claimed subject matter. As attested in the declarations, the claimed invention was conceived and reduced to practice before March 6, 2003. Applicants have submitted with the declarations an invention disclosure prepared by the co-inventors and dated before March 6, 2003. Since the invention was reduced to practice prior to the publication of the Takaoka reference, Applicants need not show diligence under 37 CFR § 1.131(b). Applicants submit that all the requirements of 37 C.F.R. § 1.131 for overcoming the Takaoka reference have been met and, therefore, respectfully request that the rejections based on Takaoka be withdrawn.

Accordingly, Applicants request that the § 103 rejections be withdrawn.

All Remaining Claims

Applicants submit that the remaining claims, being dependent from claims that are allowable for reasons stated above, are also allowable. Accordingly, Applicants requests that the objections to these remaining claims also be withdrawn.

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Conclusion

Applicants submit that all claims in the application are now in condition for allowance, and Applicants respectfully request that a timely Notice of Allowance be issued in this case.

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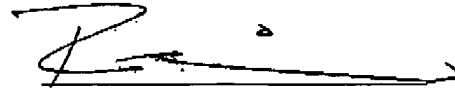
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Respectfully submitted,

10/14/2008
Date



Robert McMinn

Reg. No. 56,497

Agent for Applicants

PO Box 164140

Austin, TX 78716-4140

Phone (512) 637-0800

Facsimile (512) 306-1963